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INTERACTIVE GRAPHICS

Mr. Maisson

Use and future applications of graphics display units within IHC - Holland.

Introduction

The IHC data processing R & D group is a "centralized group with responsibilities in the fields of:

- development of new software
- software support and evaluation
- hardware support

About one year ago, a Tektronix 4014-1 graphics display unit was installed to investigate the possibilities of interactive graphics.

In this paper we will shortly describe the experiences gathered with this terminal, as well as our plans for future use and implementation.

Problems of present systems

Most of the software packages we are using today are batch oriented. Working with these software packages however does affect the users' motivation after some time. Users' complaints in general are:

preparation of input forms is an annoying job.

the user has no possibilities of controlling the process after delivery of his input forms.

there is a pretty big change the user has to solve a problem twice; the first time when he is preparing his input and the second time when he has to correct his errors.

turn around times are always too long.

In short we may say that the present software is computer oriented and not user oriented.

The answers to the problems mentioned above are in our opinion:

- direct interactive contact between user and computer
- more and faster visualization of numeric data

As hardware costs are decreasing and manpower costs are still rising, we have to prepare for an optimal use of a technicians capabilities, considering the computer just as a tool.

Main starting points

As the basic function of the Tektronix is graphic representation of numerically processed information, we decided that the graphic display unit should be able to function as an integral part of our existing drafting and plotting equipment.

Any drawing that can be done on a drafting machine or a plotter should be able to be done on a graphics display unit as well. So our first step was to develop the appropriate software.

Looking backwards we are still very happy within this decision. It extended the applicability of the graphics display unit beyond the typical field of interactive design into the area of fast verification of numerical information which is processed by batch oriented systems like Prelikon, Autokon and stress analysis programs.

Terminal characteristics and software

The Tektronix 4014-1 is a storage tube graphics display unit with a cross-hair pointing device and an ASCII keyboard. It is connected to a UNIVAC 1106 via a 600 baud line.

Important extra features are:

- hard copy unit
- data tablet

As the hard copy unit speaks for itself, we are especially interested in the use of the data tablet. We are now going to test it for its possibilities.

The software is developed by the R & D group with a mixture of Tektronix standard software and typical IHC routines.

Main problems which we experienced up to now were:

screen accuracy too low

The relatively low number of points on the screen affects both the accuracy of detailed drafting as well as the use of the cross-hair cursor for coordinate input. The first problem has now been solved via a "Zooming" method and we hope to solve the coordinate accuracy in the same way.

partial rub out possibilities do not exist

This problem is caused by the storage tube characteristics. The only way to alter a part of a drawing is: give new input, clear the screen, reprocess and make a complete new drawing. We hope to solve this problem by adding a hardware "buffer" and the use of adapted software.

For our main applications, these problems are not too critical.

Applications_

At this moment the Tektronix is used in three applications areas. These are:

- fast graphic verification of
 - Prelikon output
 - Autokon output
 - Stress analysis
 - input and output
- Design of
 - piping systems
 - developable hullforms**
- Graphics of static, administrative and financial information.

In this presentation we will shortly discuss the first two applications.

1. Verification

At the moment many pictures are generated by Prelikon, Autokon, stress analysis programs etc. The increasing number of pictures has to be drawn by a numerically controlled drafting table. The operator of the drafting table does not know the pictures, so he does not know the starting point of the drafting sequence etc. Results: long lead times, mistakes, user frustration.

Using the Tektronix the user is able to see the sequence and the big errors he has made without waiting.

The R & D group has made a program to read ESS elements and draw these on the display. Almost all of the auxiliary functions are recognized by the program and a special circle routine is developed for this purpose. Some applications are:

- drawing the points generated by Alkon.
- drawing of frames generated by stress analysis programs
- drawing plates from the Nest and Shell programs
- drawing the output from Fair

To be able to see more detailed information it is possible to enlarge a part of the picture in a very easy way.

Tests showed that the use of a graphic display unit gives a dramatic productivity improvement in norm programming.

2. Design

A very promising application is interactive design of piping schemes. The user does not have to draw the same symbols every time again, all measurement, numbering and counting of fittings and accessories is performed by the computer. Results of the program are:

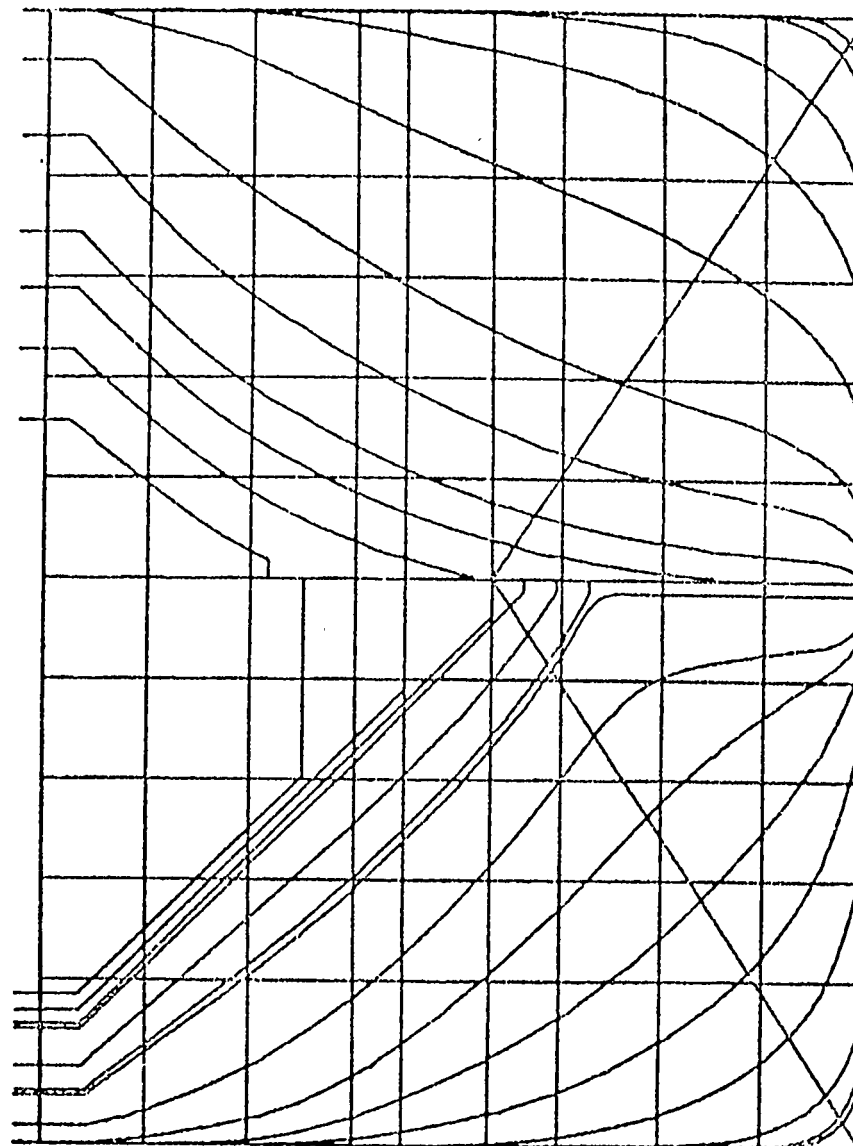
- Hard copy of piping scheme's
- Bill of materials listing
- Shop floor information

Our final conclusion is that, though there are some negative points, the graphics display unit is a very useful tool and has a large application area.

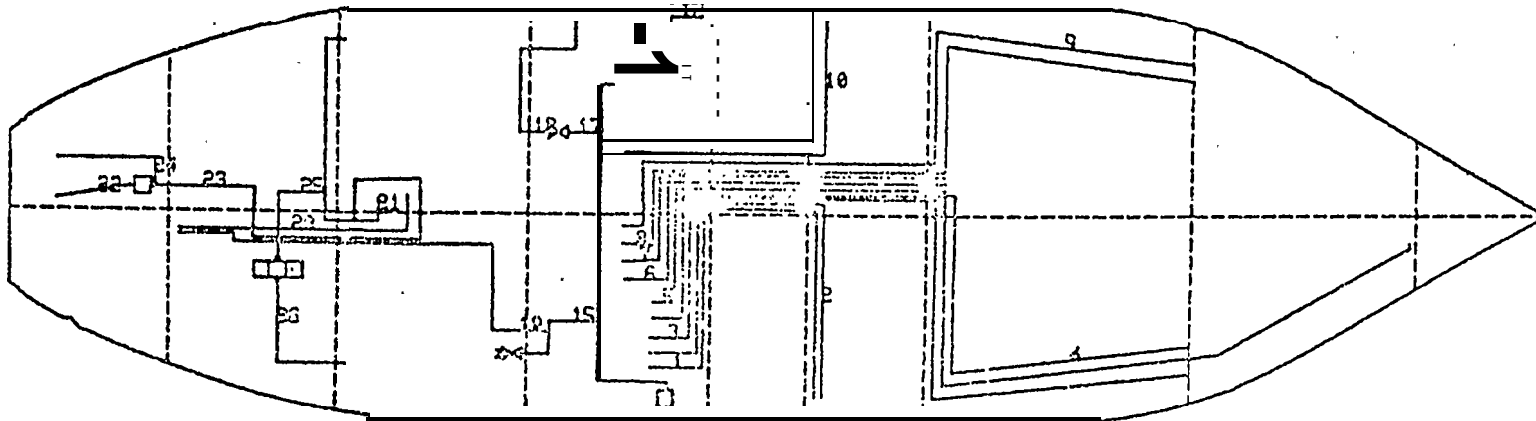
Future plans

1. Next year we are going to install Tektronix displays for use in norms and parts verification in three yards.
2. Further research of the applicability of the data tablet for fast input generation in structural analysis programs.
3. Application of graphics in interactive nesting.
Research of application of graphics via minicomputers.

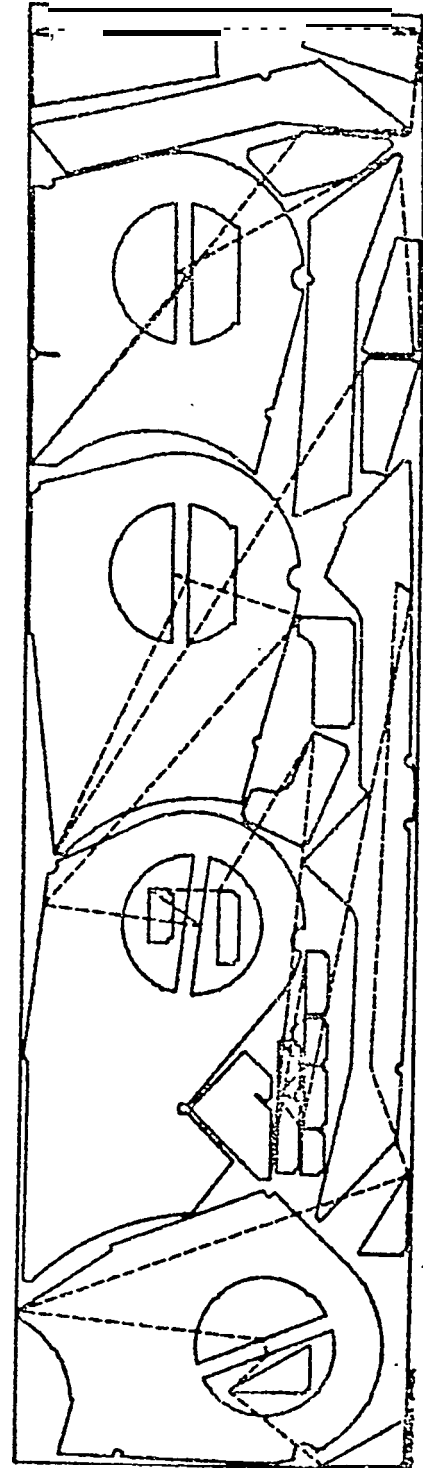
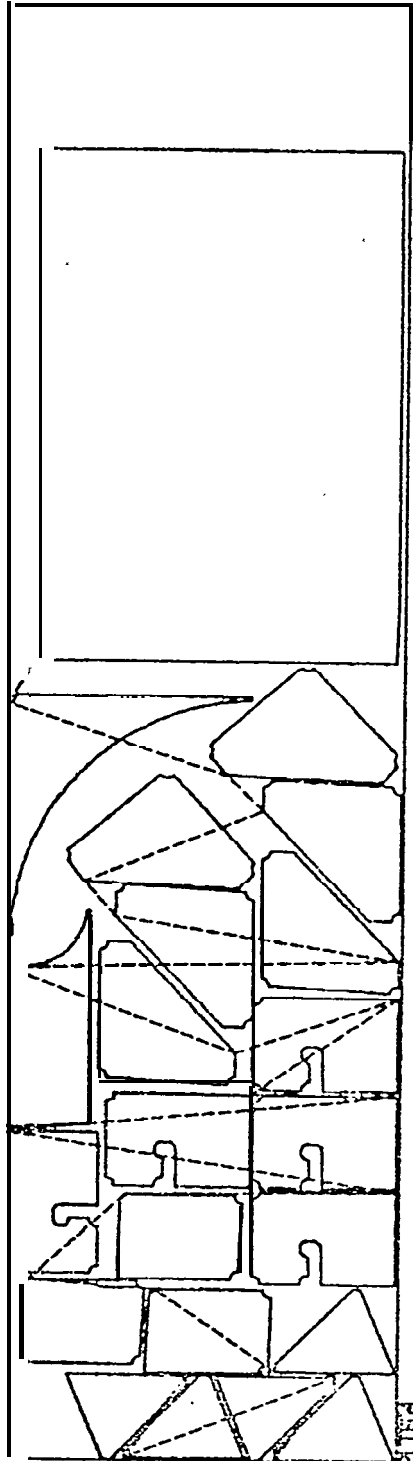
PRELIKON

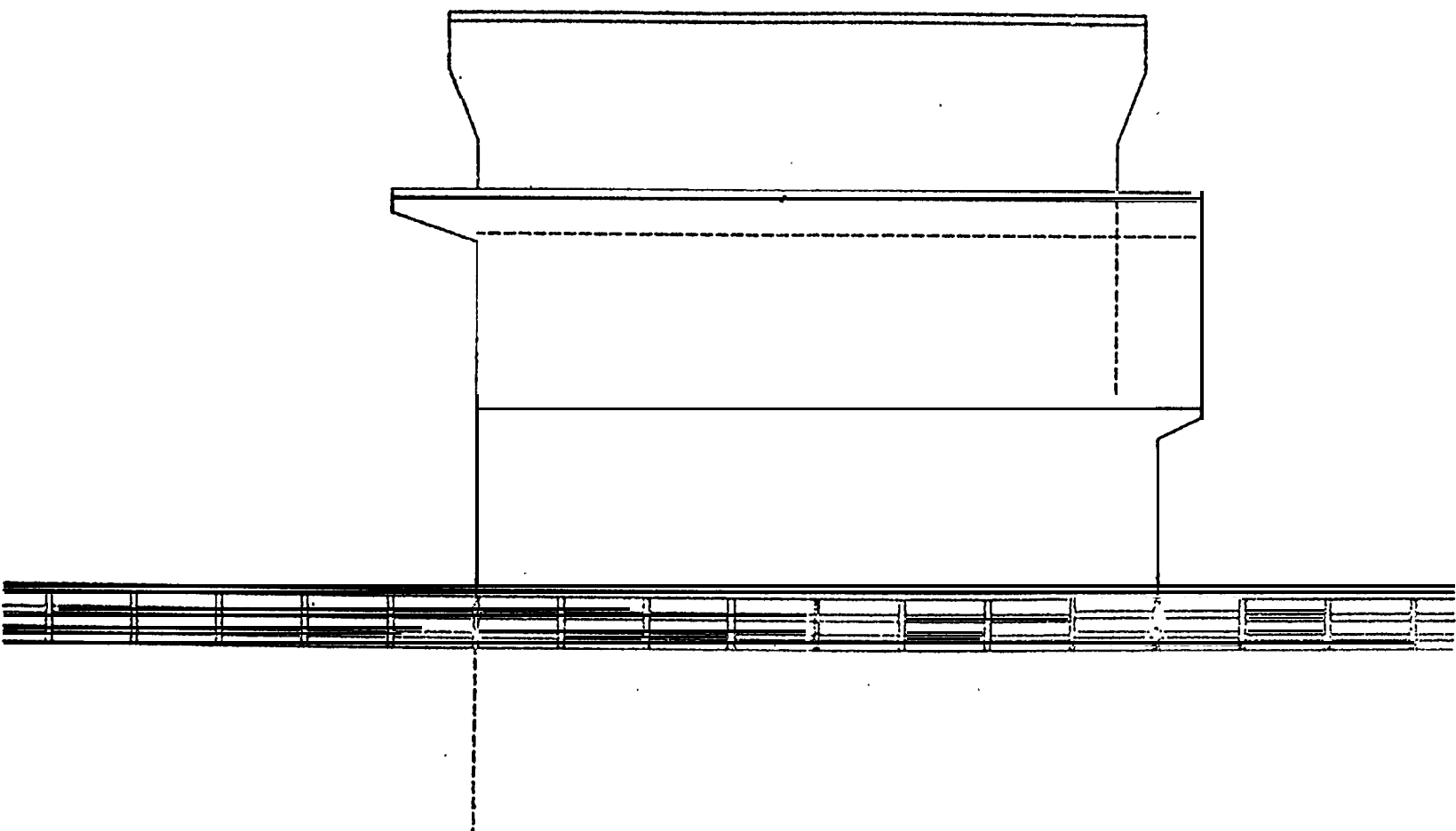


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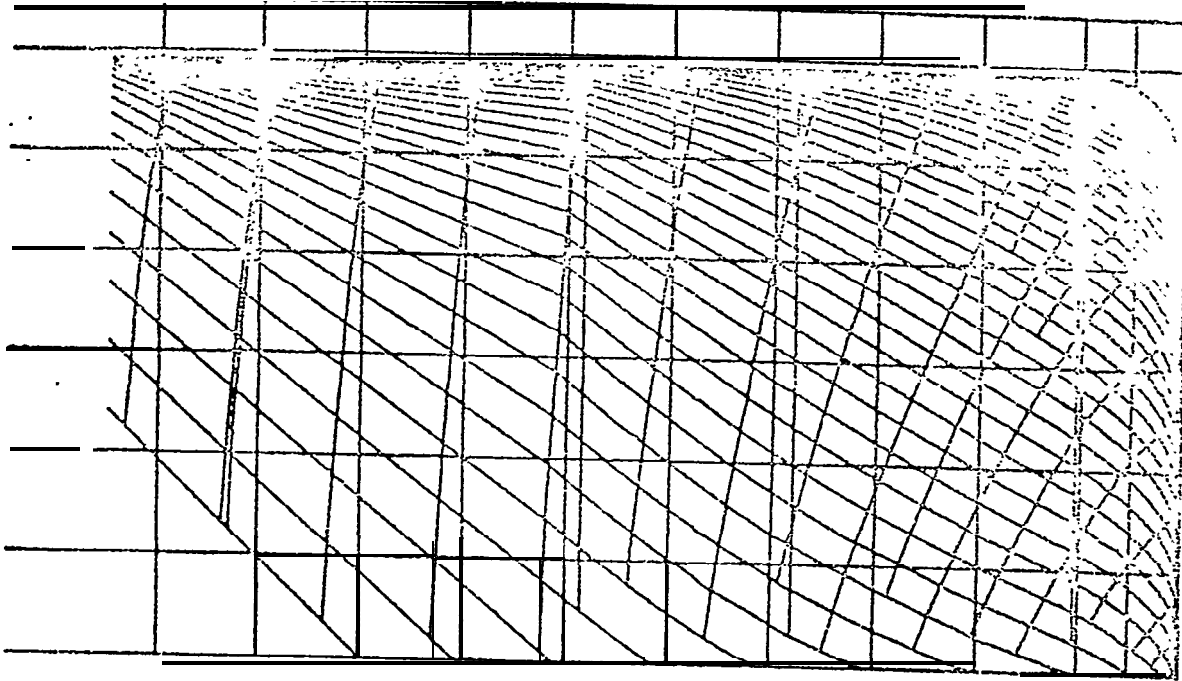


AUTOKON NEST

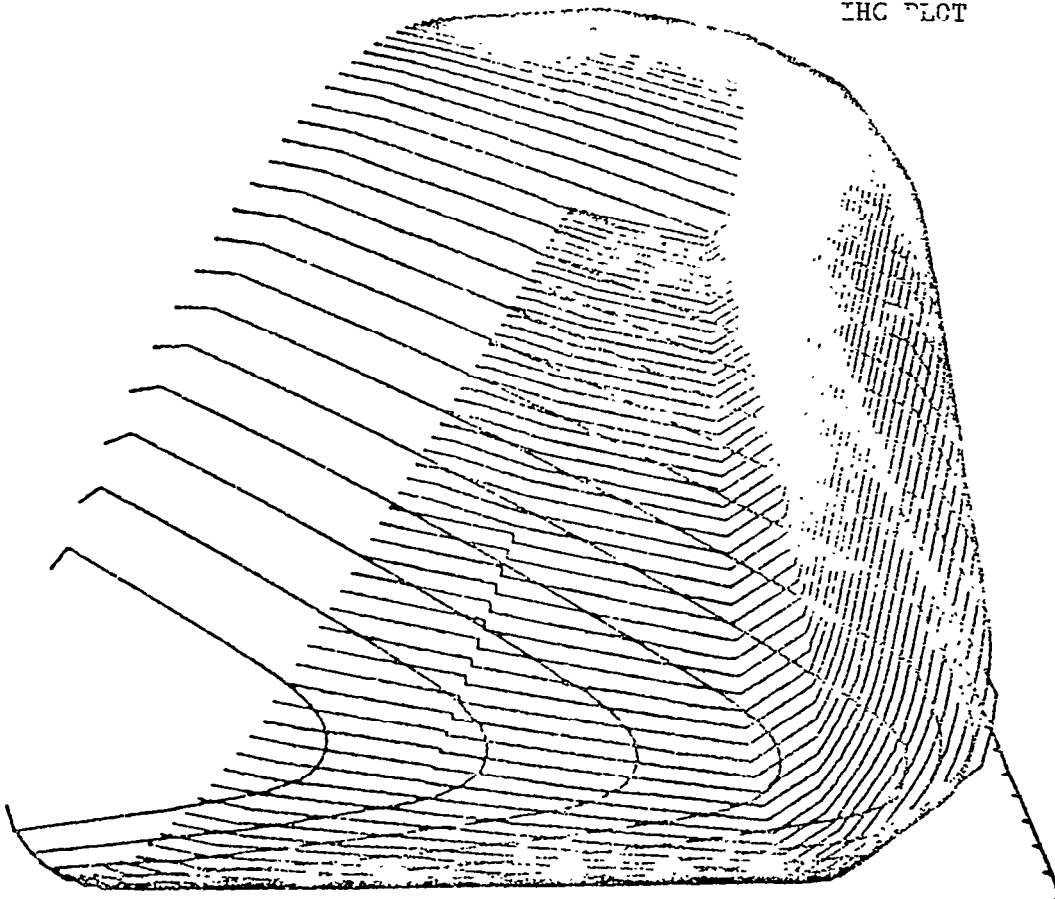




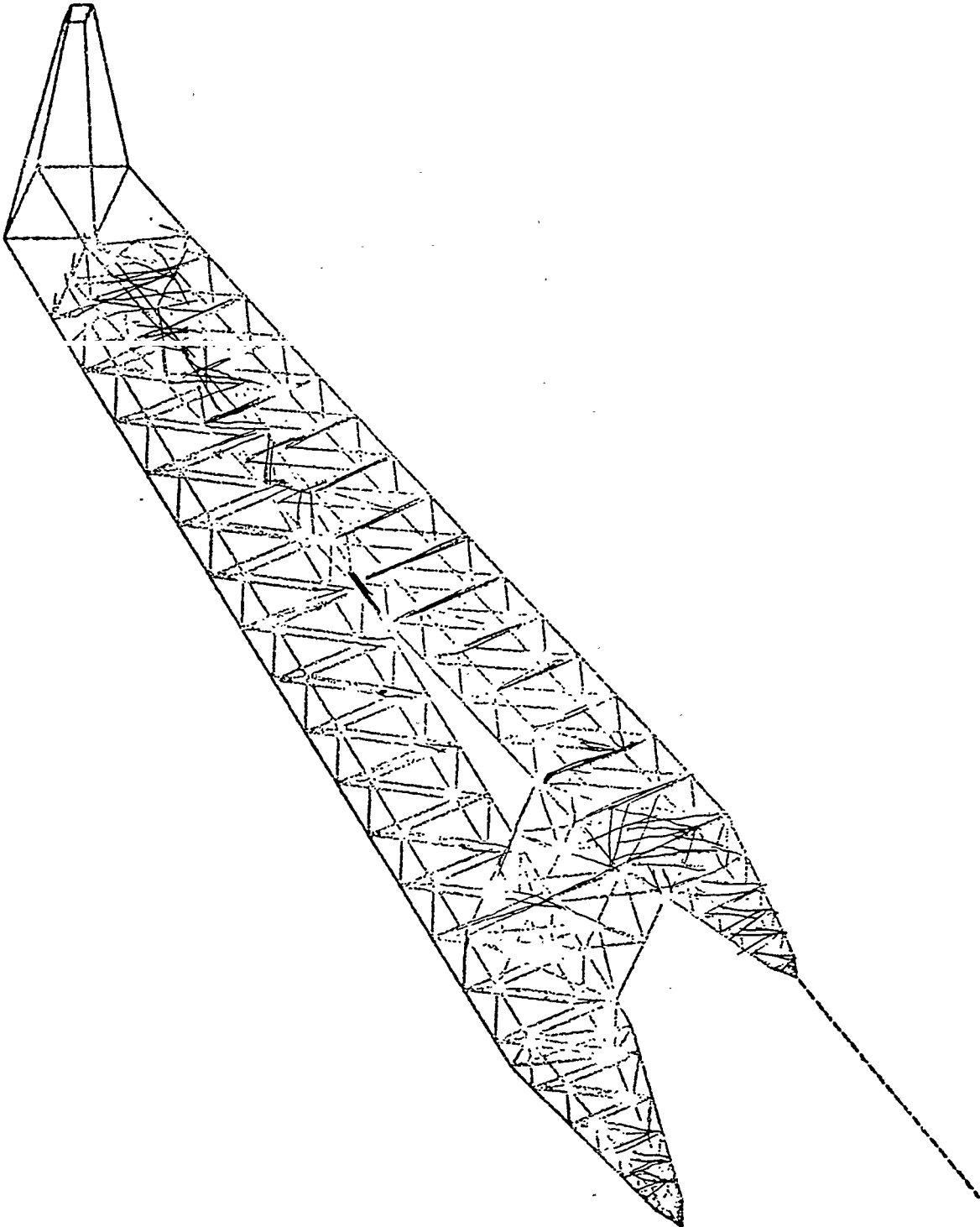
AUTOKON
LANSKI



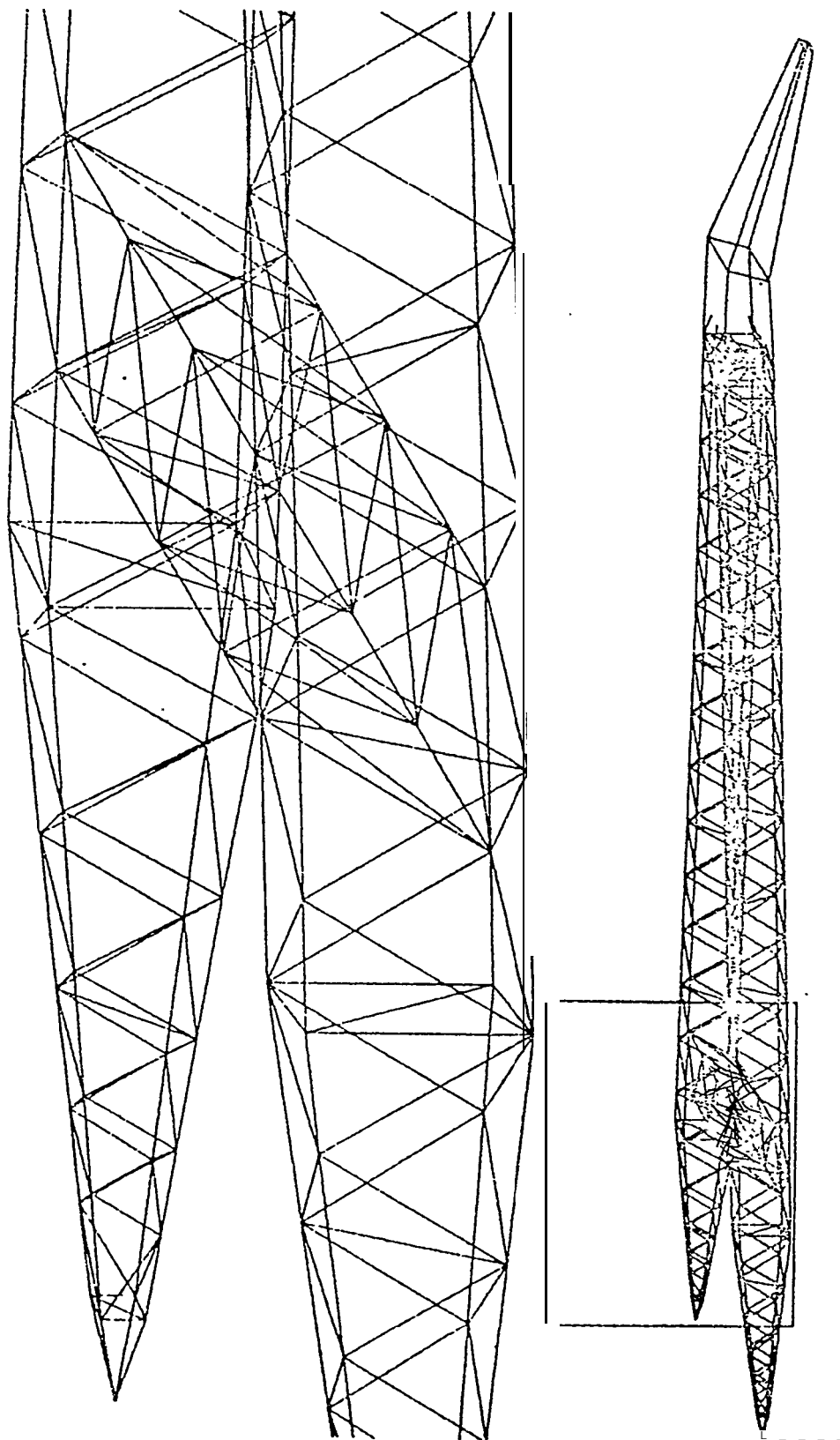
IHC PLOT



STRESS ANALYSES



STRESS ANALYSES



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